

REMARKS

Claims 1-22 and 27-38 were pending in this application. No claims have been canceled. Claims 39-40 have been added. Hence, claims 1-22 and 27-40 are now pending in this application.

Claims 1 and 17 have been amended to clarify that the particle shield and protection system are designed to provide reliable protection against hypervelocity particles. Support for the amendment may be found throughout the specification in general and at least at page 14, line 1 to page 15, line 17.

Claim 36 has been amended to clarify that the vent holes are provided in a peripheral side wall of the protective cover. Support for the amendment may be found throughout the specification in general and at least at page 11, line 21 to page 12, line 9.

Claims 36-38 have been rewritten as dependent claims.

Claims 39-40 have been added in order to more fully capture the claimed invention. Support for the new claims may be found throughout the specification in general and at least at page 14, line 1 to page 15, line 17.

No new matter has been added.

Claim Rejections

Claims 1, 2, 7-11, 13, 14, 16-22, 35-36 and 38 are rejected under 35 U.S.C. 102(e) as being anticipated by *Dvorak* (U.S. Patent No. 6,298,765).

Claims 3-6, 12, 15, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Dvorak*.

To the extent the rejections may be applied to the amended claims, these rejections are respectfully traversed.

The Claimed Invention

The present invention, as recited in amended claim 1, is directed to a particle shield designed to provide reliable protection against hypervelocity particles. The particle shield is comprised of a plurality of flexible shield layers adjacent to resilient support layers. A protective layer, with vents on a periphery thereof, encloses the flexible shield layers. A back wall serves

as the last layer of protection within the protective cover. Fasteners secure the particle shield to the structure to be protected.

Independent claim 17 is directed to a system for providing reliable protection against hypervelocity particles. The system comprises means for shocking the particles and means for supporting the shocking means. The system provides a last layer of protection and also vents gas particles through opposing sides of the flexible shield. The system also consists of means for enclosing the shocking means in a cover layer and means for securing the shocking means to the desired structure to be protected.

Independent claim 27 is directed to a hypervelocity particle shield comprising a plurality of flexible shield layers, at least one of which is made of a flexible ceramic fabric, adjacent to resilient support layers, at least one of which is a space qualified foam layer. The at least one flexible shield layer has an areal density that is substantially equal to a predetermined constant times a hypervelocity particle's cubic density multiplied by its diameter. The shield also comprises a thermal insulation layer on top of the shield layers and a back wall protector underneath the shield layers to serve as a final layer of protection. An abrasion resistant protective cover serves to enclose the flexible shield layers and has vents on a periphery thereof to facilitate venting. Fasteners are capable of releasing and securing the flexible shield layers to the structure.

Allowable Subject Matter

Applicants acknowledge with much thanks the Examiner's indication of allowable subject matter in claims 27-34.

Arguments in Support of the Claims

Applicants respectfully submit *Dvorak* is not enabling for what the Examiner contends it teaches. A long standing principle in U.S. patent jurisprudence requires that a prior art reference must be enabling for what it discloses. (“No doctrine of the patent law is better established than that a prior patent or other publication to be an anticipation must bear within its four corners adequate directions for the practice of the patent invalidated.” *Dewey & Almy Chem. Co. v. Mimex Co.*, 124 F.2d 986, 990, 52 USPQ 138 (2d Cir. 1942) emphasis added; “Even if the claimed invention is disclosed in a printed publication, that disclosure will not suffice as prior art

if it was not enabling." *Helifix Limited v. Blok-Lok, Ltd.*, 208 F.3d 1339, 1347; 54 USPQ2D 1299 (Fed. Cir. 2000) citing *In re Donohoe*, 766 F.2d at 533, 226 USPQ 619 (Fed. Cir. 1985).)

With regard to amended claims 1 and 17, although *Dvorak* does disclose a plurality of shield layers, it fails to disclose the relationship between the shielding materials, thickness of the layers, and distances or spacing between the layers with the particle size that can be "shocked." Without this information, Applicants respectfully submit that a person of ordinary skill in the art would not be able to determine the amount of shielding required to **reliably** protect the spacecraft against a given sized particle and, therefore, would not be able to practice the claimed invention. For example, a shield that is too small (i.e., thin) may not provide adequate protection against certain particles. But a shield that is too large (i.e., thick) may be overkill and, more importantly, may be prohibitive in terms of the excessive materials cost and cost to transport the shield into orbital space. This position is supported by the declaration under 37 C.F.R. 1.132 of Dr. Eric L. Christiansen, Ph.D, submitted in Applicants' previous response.

In addition to Dr. Christiansen's declaration, Applicants also submit herewith the declarations under 37 C.F.R. 1.132 of Dr. Charles E. Anderson, Jr., Ph.D. and Dr. Lalit C. Chhabildas, Ph.D., both of whom are highly regarded experts in the field of hypervelocity impact protection systems. As can be seen from their declarations, neither Dr. Anderson nor Dr. Chhabildas consider *Dvorak* as disclosing the information necessary for a person of ordinary skill in the art to practice the claimed invention. Moreover, they feel that this information is not information that a person of ordinary skill in the art would know or can easily derive. As such, Applicants respectfully submit that *Dvorak* is simply not enabling for purposes of anticipating amended claims 1 and 17. Accordingly, withdrawal of the rejection against these claims is respectfully requested.

With regard to claim 36, Applicants have amended this claim to specify that the vent holes are located in a **peripheral side wall** of the shield. In contrast, the outgassing/venting holes disclosed in *Dvorak* are located on the face of the shield. This location does not allow built up pressure within the *Dvorak* shield to be properly released. As particles impact and penetrate the shield layers, the resulting plume of debris and gases expands outwardly in all directions, including laterally between the intact portions of the shield layers where they are trapped. As a result, a significant amount of debris and gases would not be able to escape through the *Dvorak* vent holes, which are located on the face of the shield.

With regard to claim 38, while it may be inherent in the art to have a shield wherein the thickness of the shielding is based on the size of the projectile it is designed to shield, the information necessary to design such a shield is not readily known to, or derivable by, persons having ordinary skill in the art. (See the attached declarations.) Since Dvorak does not disclose or suggest the necessary information, Applicants respectfully submit that *Dvorak* is not enabling for purposes of anticipating claim 38.

As for dependent claims 2-16, 18-22, and 35-40, although they recite independently allowable subject matter, these claims depend from claims 1 and 17, respectively, and are therefore allowable for at least the same reasons. Accordingly, withdrawal of the rejection against dependent claims 2-16, 18-22, and 35-40 is respectfully requested.

CONCLUSION

The rejections and objections raised by the Examiner have been addressed, and Applicants believe that the claims are now in condition for allowance, which action is respectfully requested. If any questions or issues remain and the resolution of which the Examiner feels will be advanced by a conference with the Applicants' attorney, the Examiner is invited to contact the attorney at the number noted below.

The Commissioner is hereby authorized to charge any fee which may be required, or credit any overpayment, to Deposit Account No. 10-0447, Reference No. 46782-00007USPT (DGN).

Respectfully submitted,



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